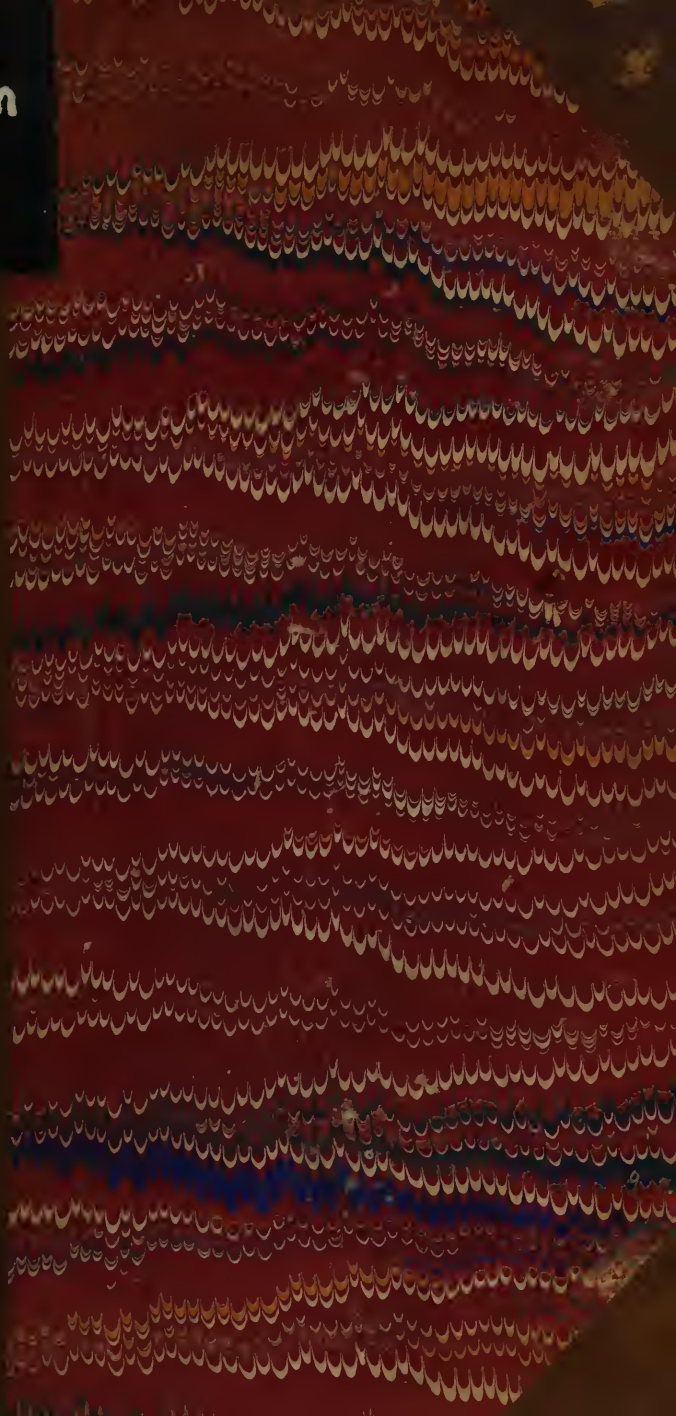


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DEAFNESS  
AND  
DISEASES OF THE EAR.

Fig. 1.

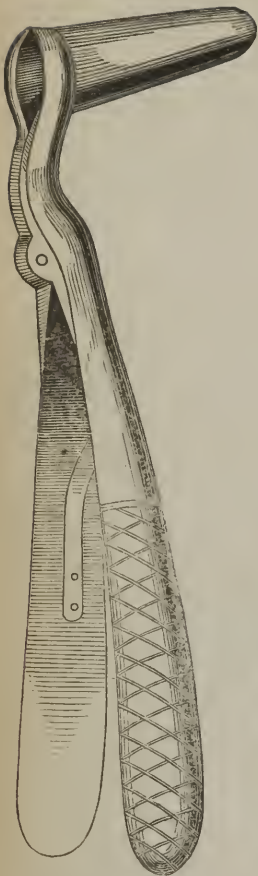


Fig. 2.



Fig. 3.

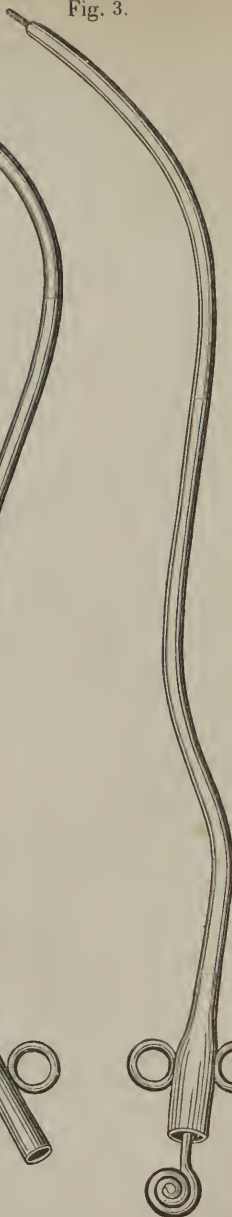


Fig. 4.



Fig. 1. Speculum Auris, recommended by Deleau and Itard, and generally used in this country.

Fig. 2. The author's Catheter for the Eustachian tube.

Fig. 3. Pilcher's Catheter.

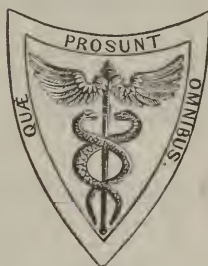
Fig. 4. Kramer's Catheter, which is made of various sizes.

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THE  
NATURE AND TREATMENT  
OF  
DEAFNESS  
AND  
DISEASES OF THE EAR;  
AND THE TREATMENT  
OF THE  
DEAF AND DUMB.

BY  
WILLIAM DUFTON, M.R.C.S.

— Sero medicina paratur,  
Cum mala per longas convaluere moras.



PHILADELPHIA:  
LEA AND BLANCHARD.  
1848.

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1848

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## P R E F A C E.

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THE practical application of the principles of science is of the greatest importance to the interests of mankind, and in no department of human inquiry is this more evident than in the application of our knowledge of the functions of the healthy body, to the restoration of it when in a state of disease. Those who have cultivated science most diligently have always been the first to point out its most important practical applications, and in no profession has science been so successfully employed as in the medical. In every department of the practical duties of his profession the light of science directs the way

of the skilful practitioner of medicine, and it is only when he misses this guide that his path becomes bewildered.

It is to be regretted that there should be any branch of medical inquiry neglected, or that any class of diseases should not have been studied with the assistance of the same scientific principles which have been so successfully applied to others; and yet every one must acknowledge that, in this country, the diseases of the ear have, to a greater or less extent, suffered this neglect. Till within a recent period they have almost entirely been consigned to the treatment of the ignorant and unprincipled empiric; but any one, with the slightest knowledge of the animal economy, must see at once that the only foundation for the proper treatment of diseases of the organ of hearing is a knowledge of the structure and functions of that organ.

In having recourse to the empiric, in cases of deafness, the public has not been so much to blame as the medical profession, for in general a superficial examination of the external ear was all that the surgeon thought necessary to make, and the remedies he prescribed seldom gave any relief. Under these circumstances it is not to be wondered at that persons suffering from pain of the ear, or deafness, should apply to those who professed to understand their complaints, and to cure them. The result of tampering with so important an organ as the ear, situated as it is so close to the brain, has been known frequently to bring on permanent deafness, and not seldom death itself.

In France and Germany, and the continent generally, deafness is said to be much more unfrequent than in this country, and this can only be accounted for by the greater amount of attention given to the diseases of the

organ of hearing, by the medical men of those countries.

The auditory apparatus is extremely complicated in its structure, and this may account, in some measure, for the tardy progress of aural surgery. But if the difficulties are great to the educated surgeon, how much more so must they be to persons unacquainted with even the elements of anatomy, or natural philosophy. Yet we find those who are afflicted with otalgia and deafness, and who would not commit a watch to repair to any hands but those of the watchmaker, unhesitatingly commit themselves to the treatment of persons who are ignorant of the anatomy of the ear, as well as careless of the effects which their remedies may produce.

In the hope of calling the attention of the profession and the public to this important class of diseases, and with a view of rescuing their treatment from the hands of the em-



piric, the writer has thrown together the remarks contained in the following pages; and he trusts that the importance of the subject will be his best apology for laying his thoughts before the public.

BIRMINGHAM,

*April 15th, 1844.*

}



## INTRODUCTION.

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No department of medicine has made slower advances than that connected with diseases of the ear and their treatment. The facts recorded up to the commencement of the present century with regard to the nature of those diseases were so imperfect, and their treatment so entirely empirical, that a history of the works till then published evinces little or no progress.

In much that had been written, there seemed to be no recognition of the great variety both in the nature and seat of the diseases of the ear; but all that could affect

this organ was summed up under the general term *Otalgia*. This word is altogether objectionable, and, as it really expresses that which is only sometimes an accompaniment of the diseased states of the ear, it had better be altogether discarded.

The ear, both internal and external, being composed of structures made up of tissues, like every other organ of the body, is necessarily liable to the same diseases. The only peculiarity of the ear deserving of notice is the secretion of a peculiar substance which is called *cerumen* or wax, and which is found in no other part of the body.

The general principles on which diseases of the ear should be investigated do not at all differ from those which apply to the investigation of other diseased parts of the body. Hence it is, that—by keeping this fact in mind, and as a consequence of the great advances which have recently been

made in our knowledge of the structure and functions of the ear—many works have lately been published on the continent on aural surgery, which have placed it on the same footing as other departments of surgical inquiry.

It was at one time not at all an uncommon opinion, even amongst medical men, that diseases of the ear, producing deafness, could seldom or never be cured, but it is now very evident that if these diseases are properly treated, they yield as easily as those of other organs.

In giving a short account of the principal diseases of the ear, the author will first treat of inflammation of the ear generally, both chronic and acute, and of its consequences; secondly, of inflammation, chronic and acute, of particular parts, as well as of the growth of tumours, and the introduction of foreign bodies into the ear; .

and, thirdly, of those diseases of the ear, which, not being inflammatory, are referred to a peculiar state of the nerves of the part.

# DEAFNESS, AND DISEASES OF THE EAR.

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## CHAPTER I.

### ACUTE AND CHRONIC INFLAMMATION OF THE EAR.

OTITIS, or Inflammation of the Ear, is one of the most frequent diseases of this organ. It may be *external*, including the auricle and meatus auditorius, or *internal*, including the tympanum and labyrinth. The inflammation of all or any of these parts may be *acute* or *chronic*. When the inflammation is acute, it has been known by the name of *otalgia* or *earache*, whilst the chronic forms, being frequently accompanied with a dis-

charge of matter from the auditory passage, have been called *otorrhæa*. Sometimes the inflammatory action seems to invade the whole organ ; but this is a circumstance of comparatively rare occurrence. However, it frequently occurs that the inflammation of one part will extend to another, involving all to a greater or less extent.

The causes of otitis are, generally, those which produce inflammation of other parts of the body. Of these, none more frequently produce this disease than the application of cold. Amongst other frequent causes may be named the contact of irritating substances, — as stimulating injections, foreign bodies, and wounds, the extension of inflammation from neighbouring parts, the irritation of carious teeth, &c. There are some persons who are predisposed to attacks of otitis, as strumous children, and those with a scrofulous diathesis, or having a venereal taint. It is also often seen in connection with cutaneous diseases, and is sometimes an attendant upon the irritation of teething.



§ I.—INFLAMMATION OF EXTERNAL EAR.—OTITIS  
EXTERNA.

*Acute Inflammation of the Auricle and Meatus.*—Inflammation of the auricle may be brought on by any irritating cause that would produce inflammation in any other part of the body. Inflammation of this part is called by most writers erysipelas of the auricle, and, according to the tissues it attacks, and its severity, it may be divided into *erythematic*, *phlegmonoid*, and *phlegmonous*.

The erythematic form is characterized by redness and softness of the skin of the auricle, with tumefaction, and frequently vesications, which are of a large size. At first, the sensation of the part is only slightly affected, and a tingling or pricking is all that is felt. A sense of heat soon comes on, and this increases, until a sensation of burning is present, which is most painful to bear. The swelling of the parts is frequently so great as to close up entirely the external meatus, so that deafness is produced, although there may be little or no inflammation in the auditory canal itself.

The phlegmonoid form of inflammation of the auricle is attended with an increase of the symptoms just enumerated, and the cellular tissue beneath the skin is implicated in the inflammatory action.

In phlegmonous erysipelas of the auricle the skin is less affected, but the cellular tissue is more involved. The redness of the part is duller and deeper, and it feels more firm and consistent, and it seldom presents vesications upon its surface.

These three forms are distinguished by their termination. The erythematic, according to its extent and severity, leaves the ear in a natural state, or with slight thickening and an exfoliation of the epidermis. The phlegmonoid is attended with an effusion of serum, and frequently adhesive matter is poured into the cellular membrane, so that the part becomes much thickened and enlarged, although by absorption it is ultimately restored to its natural size. The phlegmonous form is accompanied with the formation of an abscess, and not unfrequently with ulceration of the cartilage. Sloughing of the cartilage also not unfrequently takes place, especially where the cause of the inflammation has been extreme cold.

In addition to inflammation, the auricle may suffer from all the common forms of cutaneous disease. Some of these, as herpes and eczema, are often entirely confined to the auricle, and require, accordingly, a modified kind of treatment. The auricle is also involved in such diseases as small-pox, measles, scarlatina, &c.

The TREATMENT of these forms of inflammation should be conducted on the same general principles, its activity being regulated according to the severity of the symptoms. In most cases, saline purgatives and antimonials, with an antiphlogistic diet, will be sufficient. At the same time the inflammation has a great tendency to extend itself to the auditory canal and the inner ear, and the treatment should, on that account, be more active than the actual symptoms would seem to require. Where the inflammation is violent, the skin should be punctured with a lancet, and the bleeding encouraged. Another reason for active treatment in these diseases is the liability to destruction of the cartilage, which, in many cases, can only be prevented by early arresting the inflammation. Induration, suppuration, and sloughing require the

same treatment as when they take place in other parts of the body.

*Acute Inflammation of the Auditory Canal.*—This disease usually begins with a sense of fulness and uneasiness in the tube, which soon increases to pain. This may be slight, but it is frequently so intense as to produce exhaustion from the effect of pain alone. The lancinating pain is not confined to the ear, but shoots through to the head and neck, and is increased by the slightest motion of the jaw. A loud buzzing in the ear and partial deafness are constantly present. The lining membrane of the canal is at first dry and red, but speedily becomes swollen, and sometimes small vesications are observed upon its surface, which are filled with serum, and occasionally, when the inflammation is violent, with pus. In the worst cases, the constitutional symptoms are very severe, and the febrile excitement is ushered in by rigors. This, however, is not often seen. As the disease progresses, the vesicles or pustules break, giving rise to a discharge from the meatus, which has often a very offensive smell. This discharge ap-

pears, in many instances, to be a secretion from the ceruminous glands, and continues sometimes for weeks, and terminates in a large secretion of wax. It is frequently mixed with mucus and pus, sometimes assuming altogether a muco-purulent character, and where the inflammation is severe is often tinged with blood. The character of the discharge in these cases has sometimes been made a means of distinguishing various forms of this disease, and Itard's external catarrhal otitis and external purulent otitis depend on a distinction in the nature of this secretion.

If the above symptoms are not relieved, the inflammation goes on till an abscess is formed, which bursts and gives vent to a thick yellow pus, which is mostly streaked with blood. When this occurs, the patient receives immediate and striking relief. Such abscesses sometimes occur in children during dentition, and are probably the cause of the otorrhœa, which occasionally is present at this period.

The TREATMENT of inflammation of the auditory passage must be conducted on principles similar to those applicable to inflammation of other or-

gans. According to the urgency of the symptoms, both local and general bleeding must be had recourse to. In most cases, leeches behind the ears will be found serviceable. Purgatives and antimonials should be administered. Fomentations with warm water, or with the addition of chamomile flowers and poppy capsules, should be externally applied. When the more active symptoms have been subdued, blisters behind the ears will be found beneficial. Itard recommends that a few grains of opium, in some emollient decoction, should be injected into the ear, before the discharge has occurred. Pilcher, on the other hand, says that the mildest injections have a doubtful effect in acute inflammation of the meatus. If, after the subsidence of the inflammation, the discharge continues, a mild astringent lotion, with acetate of lead, may be dropped into the ear with benefit.

When an abscess forms, and projects into the meatus, it should be opened as early as possible, and this is best done by means of a cataract needle, or some small pointed instrument. Where suppuration takes place in the cellular tissue, the pus may be sometimes got rid of by making an

opening externally, and thus prevent the discharge into the meatus.

In treating of the diseases of the external meatus, Kramer has divided them into erysipelatous inflammation of the meatus, inflammation of the glandular structure, inflammation of the cellular tissue, and inflammation of the periosteum. This division is founded on the supposition that inflammation attacks one tissue without the others; but it will be found in practice that seldom is one tissue diseased alone in acute inflammation, and that although one tissue may be attacked first, it soon extends to the surrounding parts.

*Acute Inflammation of the Membrana Tympani.*—

This is by no means an uncommon occurrence, although the earlier writers on diseases of the ear have entirely passed it over, or mentioned it only in connection with otitis interna. Kramer, Pilcher, and Wharton Jones have, however, in their works recognized its existence, and described its symptoms. When acute inflammation occurs in this membrane, pain is felt at the bottom of the meatus, which may follow the application of cold, or any

irritating substance, or a slight mechanical injury. The pain often extends to the throat, and though not increased by the motions of the jaw, it is by the actions of sneezing, coughing, &c., and also by loud noises and changes of external temperature. There is also a sensation as though an insect were buzzing, and a fluttering in or near the ear. Hearing is considerably impaired.

The external parts of the ear remain unaffected, but on examination of the *membrana tympani* it will be found at first of a dull yellow colour, which gradually changes into red. Blood-vessels may be seen upon its surface, and frequently the handle of the malleus cannot be seen, on account of the turgid condition of the dermal covering of the membrane. Some portions of the auditory canal in the vicinity of the membrane will be found red, and the inflammation often indeed extends to the neighbouring parts; but the above symptoms are more particularly characteristic of simple inflammation of the membrane. It is often attended with general febrile disturbance, which exacerbates in the evening.

This disease may terminate by resolution, but



commonly it leads to a greater or less organic change of the part, such as thickening and ulceration. These, however, are the results of the chronic form of the inflammation, which will be spoken of further on.

The TREATMENT of acute inflammation of the membrana tympani will require some modification, according to the age, temperament, and especially the diathesis of the patient. In mild cases, the application of warmth to the part is frequently sufficient to remove the disease ; but if the pain is severe, and there is much fever, leeches should be applied, and even general bleeding should occasionally be resorted to. Nothing but warm fomentations, and a little almond oil dropped into the ear, should be used externally. An antiphlogistic regimen should be strictly enforced. Dover's powder may be administered, also purgatives. Where these fail, small doses of calomel and opium may be given every five or six hours, till the gums are slightly affected. It is of importance to cut short this disease in the inflammatory stage, on account of the thickening and ulceration of the membrane which are likely to ensue if it be allowed to take its course.

Care should be taken to distinguish this inflammation from neuralgic pains in the membrane, as the introduction of stimulating injections into the ear, which frequently relieve the latter, would be attended with a dangerous increase of the former. The mildness of the symptoms, with the appearance of the tympanum, will distinguish it from otitis interna, and the latter also from otalgia.

*Otitis externa chronica—External chronic Otitis.*—

Inflammation of the auricle, meatus, and membrana tympani may in its origin be *chronic*, or it may arise from the cessation of acute inflammation. Idiopathic chronic inflammation of these parts is more frequent than acute, and, continuing for a great length of time, produces cophosis to a greater or less degree. In most of its forms, at least when the meatus is involved, it is attended with a ceruminous, mucous, or muculent discharge; and on this account those diseases are frequently called by the name of *Otorrhœa*. But as this name only indicates a symptom which is not constantly present even in chronic inflammation of the meatus, it will only be used in this

work to denote a purulent or mucous discharge from the ear. This term has been applied by Mr. Curtis to designate a uniform discharge from the tympanum ; but, as Mr. Pilcher justly observes, discharges are quite as frequently produced by “a diseased action of the dermal membrane of the meatus auditorius,” and therefore the word ought not to be used in this restricted sense.

*Chronic Inflammation of the Auricle* is produced by the same causes as inflammation in other parts of the body. The auricle, however, is constituted so as to bear considerable exposure to cold without receiving injury, and is less liable to disease from the action of this agent than most other organs. At the same time, as the auricle is frequently exposed for a great length of time to a very low temperature, the consequence is that it becomes frost-bitten, and may thus be immediately deprived of its vitality. Persons also afflicted with diseases which compel them to lie for a length of time on one side, have a chronic inflammation of the auricle brought on from the effect of the pressure alone. The barbarous prac-

tice of boring the ear for the insertion of rings is a frequent cause of disease of the auricle. In many cases an enlargement and thickening of the lobe takes place, whilst in others an irritation is kept up, which may at last extend itself to the auditory canal.

In the common chronic inflammation of the auricle the same symptoms are present as in the acute form, but they are not so violent. There is slight pain, the redness is not bright, the heat is only slight, the tumefaction is at first very little, but it gradually augments as the disease progresses. It may terminate in a great enlargement of the ear from an increased nourishment of the part, or induration may take place from the deposit of lymph in the cellular tissue.

In the TREATMENT of this disease the general health should be attended to in the first instance, as it frequently occurs that those local affections are kept up by some derangement of the whole system. Where there is ulceration or a hardened or thickened state of the ear, it will be benefited by the application of the *unguentum hydrargyri nitratis diluti* or of iodine. If the irritation is

kept up by any local irritant, that should be removed ; and if it occur during dentition, it may be desirable to lance the gums, in addition to the general treatment.

*Chronic inflammation of the external Auditory Canal.*—This is frequently combined with chronic inflammation of the membrana tympani ; but as these diseases can exist separately, they had better be spoken of under distinct heads. Chronic inflammation of the meatus has been distinguished by several names by writers on diseases of the ear, according to the symptoms it presents. Where inflammation is only slight, and attended with no fluid secretion from the meatus, it has been called by Mr. Pilcher “erythematic chronic disease of the meatus ;” and where there is discharge, “chronic inflammation of the dermal membrane, with inordinate secretion.” The latter is probably only a more advanced and severe form of the former. These diseases generally occur in persons who labour under what is called a strumous diathesis. Such persons are very liable to all the forms of scrofulous disease ; and it should

be borne in mind, when treating these diseases of the ears, that the constitution is mostly seriously at fault.

On the commencement of the first form of this disease, the erythematic, the pain is so inconsiderable, and the dulness of hearing comes on so gradually, that it frequently goes on for a long time without attention. There will be felt sometimes a sensation of dryness, and of tingling at the bottom of the ear, with occasionally a sense of heat. At times there may be a slight mucous discharge ; but more frequently, and especially in old persons, there is a dry scaly secretion in the auditory canal, thrown out by the ceruminous glands, which has been produced by the exposure of the secretion to the air, the aqueous part having evaporated. This secretion extends over the whole canal, and frequently covers the *membrana tympani*. These symptoms may exist for years, and excite but little apprehension. In such cases the deafness is only slight ; it is scarcely if at all noticed. The deafness in these cases arises from two causes : first, from the narrowing of the auditory canal ; and, secondly, from a thickened

state of the membrane, which is reflected over the membrana tympani. If the ears of a person affected with this disease are examined, the canal will be found to be dry, and to contain a scaly kind of matter, which is secreted by the sebaceous follicles, and which extends over the whole canal, frequently covering the membrana tympani itself.

Sometimes inflammation of the subcutaneous cellular tissue of the auditory canal takes place, and, when kept up for a length of time, produces a narrowing of the tube, arising from the interstitial deposit in the cellular structure. This form of chronic inflammation of the meatus is easily excited into the acute or subacute forms of inflammation, and then small abscesses are formed which break into the canal, and relieve the pain and uneasiness, which they invariably occasion during their formation. The subacute form of inflammation of the subcutaneous cellular tissue frequently involves the dermal membrane, and thus produces an almost entire closure of the auditory canal. The discharge in these cases is mostly due to the formation of the small abscesses which are usually formed.

The following case will illustrate the preceding remarks.

*Case of chronic inflammation of the external auditory canal, with narrowing of the tube, caused by interstitial deposit in the cellular tissue.*—Mrs. D., aged fifty-five years, had been suffering from deafness for some months. Upon examining the external ear, the meatus was found to contain a dry scaly secretion, and the tube was so much narrowed as only to admit a large probe. The tragus also was much thickened, from previous disease. The canal was ordered to be syringed out occasionally with warm water, and an ointment, composed of one drachm of *unguentum hydrargyri nitratis* and two drachms of *ceratum cetacei*, was directed to be applied to the meatus and thickened part of the ear, by means of a camel-hair pencil, twice a-day. Alterative medicines were also prescribed, for the purpose of improving the general health. In the course of a few weeks, the hardness and the interstitial deposit in the cellular membrane were removed, and the tube presented a healthy appearance. Hearing was also perfectly restored.



*Chronic Inflammation of the tegumentary Lining, and ceruminous Glands of the Auditory Canal.*—This disease is called, by Itard and Andral, on account of the discharge which usually accompanies it, “mucous or catarrhal otorrhœa,” and by Pilcher, “chronic inflammation of the dermal membrane, with inordinate secretion.” This form of disease is perhaps the most common to which the ear is subject. It frequently occurs in children during dentition; it also occurs in adults, and is then the consequence of acute inflammation, the application of irritating substances, &c. Itard says it may occur from metastasis in gout, ophthalmia, gonorrhœa, and other diseases. It is a very frequent accompaniment of a scrofulous constitution.

The symptoms of this disease vary:—in some cases, they are mild, and excite but little attention; in others, they are more severe. It is always attended with more or less dulness of hearing, and in some cases there is buzzing in the ears. It is seldom that one ear alone is affected, although one generally suffers more than the other. The lining integument of the canal is covered with

crusts which are formed by puriform matter escaping from vesicles and pustules underneath it, and from beneath these crusts an offensive ichor is constantly discharging. This ichor varies in character, and is sometimes thin, dark, and very offensive, and at others, of a yellow muco-purulent character, with less odour. On examination, the dermal membrane will be found to be spongy, and very vascular, and will sometimes bleed on the slightest touch; and in such cases the discharge from the ear is usually mixed with blood.

In all cases of otorrhœa, or discharge from the ear, great care should be taken to distinguish the part from which the matter comes, as much injury has resulted from the improper use of remedies for disease of the external ear when the internal ear has also been involved.

In the TREATMENT of these forms of external chronic otitis, the general health will always require the first attention. The diet should be regulated, occasional purgatives, with mild alteratives, should be administered, and the preparations of sarsaparilla and iodine may be combined with advantage, for the purpose of acting generally

on the system. When the skin is dry, mild antimonials may be given. Whilst the general health suffers, all the local treatment necessary will be the keeping of the auditory passage clean, by gentle syringing with warm water. When other applications can be borne, injections with the sulphate of zinc or of copper have been strongly recommended. A better remedy, however, than either of these is the nitrate of silver, which should be employed in the proportion of from two grains to twenty, to the ounce of distilled water. In some cases the nitrate of silver in substance may be applied with advantage to the affected part. Leeches are rarely found to be necessary, but counter-irritation behind the ear is frequently beneficial. For this purpose blisters may be applied, and kept open, but they should not be placed directly behind the ear, as they are likely to keep up irritation by sympathy. The use of the ointment of tartarized antimony, as a counter-irritant behind the ear, will also be frequently found of service.

The beneficial effects of the injection of nitrate of silver in this disease is well illustrated by a

case published by Mr. Earle, with many others in the tenth volume of the 'Medico-Chirurgical Transactions.' It occurred in a gentleman, an officer in the army; he had been subject to attacks of inflammation in his ears from childhood. The diameter of the meatus auditorius was considerably lessened, arising from a thickened state of the surrounding parts, especially of the cuticle, and was attended with considerable discharge. An injection was ordered, consisting of twenty grains of nitrate of silver to the ounce of distilled water, and this was occasionally made use of, with injections also of warm water; and in the course of a short time the thickened cuticle was separated and thrown off, and the patient was enabled to resume his duties, which had before been interrupted on account of his deafness.

*Chronic Inflammation of the Membrana Tympani.*—This disease may be merely an extension of the inflammation in the auditory canal, but it sometimes occurs independently of other diseases. It may commence in the chronic form, or arise from the subsidence of acute inflammation.

The symptoms attendant on this lesion are dullness of hearing and pain or uneasiness at the bottom of the canal. If the membrane be examined, it will be found red, in a greater or less degree, according to the extent of the inflammation. This redness either covers the whole membrane, or is confined to particular spots; sometimes small vegetations can be observed on its surface, and the commencing existence of polypus or fungus. In most cases there is a discharge from the auditory canal, but this is not uniformly the case. One of the effects of this inflammation is frequent ulceration of the whole or part of the membrane; and when it becomes from this cause extensively destroyed, the bones of the ear are exposed, and frequently become affected with disease and are partially destroyed. Scarlatina maligna is an occasional source of inflammation and sloughing of the membrana tympani; the small bones are then discharged, and deafness is the result. If the canal is examined when the membrane is entirely destroyed, it will appear dark at the bottom, and if the Eustachian tube be pervious, air will be expelled through the ear on blowing the nose.

In order that the bottom of the canal may be properly examined, it is necessary to dilate the tube and to render the obliquity of the canal as little as possible. This is best done by the aid of the speculum, and the patient should be so placed that the rays of the sun may fall upon the membrana tympani. A lamp is sometimes used, but a wax taper answers the purpose very well, and is much more convenient. Kramer has invented and given a drawing of a lamp, with reflectors for this purpose, by means of which the rays of light are converged and thrown on one spot.

Another mode of examining the membrana tympani is by carefully striking it with a probe. When the membrane is perfect touching it will produce pain, and a slight noise will be heard by the patient, and the membrane will be felt to be elastic by the operator. If the membrane be ulcerated there will be no elasticity felt, and little pain and no noise excited, and the probe may be felt striking against the inner walls of the cavity.

When there is a rupture of the membrana tympani, it may sometimes be detected by the fact that there is a communication between the middle

ear and throat, through the Eustachian tube. This is made evident by the patient being requested to close his mouth and nostrils, and then to make a violent expiratory effort, when air will pass through the Eustachian tube into the tympanum and meatus, and the rush of air at the external opening may be detected by its moving the hairs about the meatus, or the flame of a candle, or any light body that may be presented to its action. When there is fluid in the tympanum or auditory canal a gurgling noise will be heard. Warm water also, under these circumstances, may be injected, by means of a catheter introduced into the Eustachian tube, into the meatus. The membrane, however, may be imperfect, and the communication between the Eustachian tube and auditory canal closed in some part of its course, so as to prevent the application of this test.

In some persons the auditory canal is almost straight, and in these cases the *membrana tympani* is easily seen. Such persons are generally found to be dull in hearing, as it appears that the obliquity of the canal increases the reflecting of the waves of sound, and thereby increases their effect upon the organ of hearing.

The TREATMENT to be pursued in chronic inflammation of the membrana tympani must be much the same as that for the same disease of the auditory canal. It often happens that persons do not apply for assistance in this complaint, till it has gone on so long that it is almost impossible to relieve it. Where the membrane is perforated, there is less chance of relief than when this part remains entire. In all cases care should be exercised with regard to the application of stimulating injections, as these sometimes produce acute disease, which not unfrequently extends along the tissues of the brain, producing fatal consequences.

Unfortunately, this class of cases is such as most frequently falls into the hands of the empirical practitioner, who mostly employs stimulating and irritating substances in the form of injections, and thus produces great mischief. Such persons, too, from the long standing and incurability of their disease, often apply to any one who will hold out a promise of cure, and are frequently submitted to a treatment which is entirely incapable of affording them the least relief, and many times otherwise seriously injures their constitutions.



In the treatment of these cases cleanliness is of the greatest importance, and the ear should be well syringed with water, which should be repeated several times in the day, according to the quantity of puriform matter secreted. When the membrane is ulcerated this requires caution, and the amount of force used should be adapted to the feelings of the patient. Dr. Kramer recommends in all cases, whether with or without perforation, a solution of acetate of lead, in the proportion of from one to ten grains in an ounce of water. This should be dropped into the ear, either cold or tepid, twice or three times a-day. This removes, he says, "in a singularly rapid and complete manner, the ammoniacal odour of the discharge. Where there is plethora, saline purgatives and a spare diet should be had recourse to ; but in no case will leeches be found of advantage.

§ II.—INFLAMMATIONS OF THE MIDDLE AND INTERNAL EAR.—OTITIS INTERNA.

*Inflammation of the Tympanum.*—Pilcher remarks that this disease might be more properly called otitis media, in accordance with the designation usually given to this part of the ear. Under otitis interna is included several forms of disease, which have had various names given to them by writers on aural medicine. As in otitis externa, we divide these diseases into *acute* and *chronic*. There are more particularly two forms of acute inflammation of the tympanum, or rather the inflammation assumes such a character as to be recognized by two very distinct sets of symptoms. The one form attacks only the mucous lining of the cavity of the tympanum, and is attended with an increase of the mucous secretion of the part, and has been called by Itard “catarrhal internal otitis,” and by Kramer “inflammation of the mucous membrane of the middle ear, with accumulation of mucus.” The other form may not only affect the mucous membrane of the tympanal cavity, but extends to the submucous cellular

tissue, producing suppuration, and is called by Itard "purulent internal otitis," and by Kramer "true inflammation of the ear." The first is a mild disease, not requiring active treatment, and never fatal to life, whilst the latter is attended with severe symptoms, requires very active treatment, and often ends in death. It is the dangerous nature of this latter disease that renders it necessary, in all cases of diseases of the ear, to proceed with caution and skill, as it is not unfrequently excited by improper applications to some of the diseases mentioned in the previous pages. And here it may be necessary to reiterate a caution against *the indiscriminate application of stimulants to the ear for what is usually called earache*. Tincture of castor, brandy, and the like, call for condemnation in an especial degree, as they are usually empirically applied, and when the membrana tympani is ulcerated, fearful, if not fatal, consequences may ensue.

*The acute form of Inflammation of the submucous cellular Tissue of the Tympanum* is attended with decidedly febrile symptoms. Frequently, the local symptoms are preceded by a rigor, and there are alternations of heat and cold till the inflammation

is fully established. The first thing a patient complains of, in the midst of these symptoms, are acute pains deep in the ear, which are described as pricking, burning, tearing, boring, and dragging. These pains are usually confined to one ear, and are aggravated by every motion of surrounding parts, as in chewing, sneezing, coughing, stooping, and the like. The disease sometimes extends down the Eustachian tube, over the pharynx and tonsils, and into the mastoid cells, and pains are felt over the temporal bone and towards the vertex or occiput. Sometimes the mastoid process is tender on pressure, and not unfrequently the vicinity of the whole ear is swollen; the eye of the affected side becomes increasingly sensitive to light, is suffused with tears, and reddened. As the disease progresses the fever augments, the nights are perfectly restless, pain in the head of a most insupportable character coming on, and is attended with delirium, frequently of the most violent kind. The pulse is hard and frequent, thirst great, urine scanty and high coloured, constipation, great heat of skin, and, not unfrequently, vomiting. These symptoms continue, and in the course of a few days the pa-

tient dies with all the indications of inflammation of the brain. But it frequently happens that, in the midst of the most violent symptoms, a purulent fluid suddenly escapes from the tympanum and out of the meatus, or sometimes an abscess forms, which bursts over the mastoid process, and in these cases the matter is frequently bloody, of a very offensive character, and contains fragments of bone, and even the small bones of the ear. Sometimes the discharge of matter takes place from the Eustachian tube, but in most cases, the tube is closed, at the commencement of the attack, by adhesive inflammation, or from tumefaction of its walls.

On the occurrence of the discharge, which most frequently takes place by rupture of the membrana tympani, an alleviation of all the active symptoms occurs, and a favourable termination of the case may be looked for. Even after this desirable event has taken place, however, some cases terminate unfavourably, especially where there is a cachectic state of the constitution. Hectic fever succeeds to the acute symptoms, the pains in the head continue, emaciation goes on rapidly, and the patient suddenly dies apoplectic.

In some cases, where active remedies are had recourse to early in the progress of the symptoms, this disease may terminate in resolution. It is, however, only rarely that such a termination is observed, and it is too frequently the case that the medical man finds all his attempts to save the life of his patient vain. The post-mortem examination of these cases presents generally the indications of acute inflammation of the substance of the brain, or its meninges. In the majority of cases this inflammation appears to extend from the lining membrane of the tympanum to the bone, and from thence to the dura mater and the other membranes of the brain. Sometimes the inflammation, producing suppuration, is extended to the cavity of the skull, and pus has been found between the cranium and dura mater and the membranes, and in the substance of the brain itself. In these latter cases, however, there is mostly caries of the bones of the tympanum, rendering it most probable that the acute disease has been the result of a previous chronic one.

The diagnosis of this disease is not difficult in the more advanced stages, provided the patient has the power of directing attention to the pain he

suffers in the ear. Even in infants this may be detected, by their constantly grasping the affected ear. But in the earlier stages it may be confounded with external acute otitis. Freedom from disease in the auditory canal by examination is a good diagnostic mark where it exists; but internal otitis may come on in variously diseased states of the meatus, so that an examination of the canal will not always be a sufficient guide. Another distinguishing sign is the period at which discharge comes on in the two diseases. In external otitis the discharge is observed almost as soon as the pain, but in internal otitis a period of some days, or even a week, elapses before it makes its appearance. The former also appears gradually, whilst the latter comes on suddenly.

The causes which produce internal otitis are many of them of the same character, but more severe than those which excite external otitis. Cold applied to the ear, either through the membrana tympani or Eustachian tube; the extension of inflammation from the fauces along the Eustachian tube, or along the meatus externus through the membrana tympani; injury to the membrana

tympani, or irritating applications to it when in a state of disease or lacerated ;—any of these may produce suppurative inflammation of the tympanum. The most frequent cause is undoubtedly that form of the application of cold, which occurs when the ear of a person is exposed to a draught of cold air. The external ear is defended from the direct depressing and exciting influence of this agent by the secretion of wax in the auditory canal, but the tympanum is exposed to its indirect action, and in persons predisposed to disease of the ear, exposure to a current of air will frequently bring it on. It is said sometimes to come on from the suppression of distant diseases. This is not improbable, as the same thing is constantly occurring in persons with a scrofulous habit; and it is in such individuals that internal otitis is most frequently seen. However, it may occur in debilitated habits from various causes, and it is not uncommonly met with after syphilis.

The TREATMENT of acute inflammation of the tympanum must be of the most active kind. It should, however, be remembered that this disease most frequently occurs in debilitated and scrofulous constitutions that do not bear depletion



well. Bleeding, both general and local, should be had recourse to, until a decided impression is made upon the system. The bowels should be opened by active irritating purgatives; and if the severe symptoms do not speedily yield, mercury should be administered, in order to produce rapid salivation. When the pain is somewhat alleviated, blisters may be applied, at first between the shoulders, and subsequently, in the immediate vicinity of the auricle. Fomentations with hot water, and the steam of decoction of poppies, may be applied to the ear, but all stimulating injections should be carefully avoided. Warm almond-oil has been recommended to be poured into the ear. Where suppuration has taken place, and the matter is not discharged, the case becomes most urgent, but it is frequently impossible, by the nicest discrimination, to decide upon the presence of such an accumulation. If, however, upon a close examination of the *membrana tympani*, it should be found that it has a convexity, as if produced by pressure from within; and if there is pain or tenderness on pressing on the mastoid process, as if the inflammation and suppuration had extended o that point, notwithstanding the active treat-

ment employed ; then, in such a case, the surgeon would be justified in puncturing the membrana tympani, in order to allow of the escape of the pus, supposed to be collected there. With the exercise of the greatest caution, and the soundest judgment, the puncture might be made in vain, but the step would be warranted by the necessities of the case. Undoubtedly, the most desirable mode of getting rid of the pus is through the Eustachian tube, when this can be done without pain or violence. For this purpose Itard and others have recommended gargles, which should act, by removing obstructions of the tube. The smoke of tobacco, sent into the tube, during expiration, the mouth and nostrils being closed, has also been used with the same object in view, but these means have been rarely effectual in accomplishing the object. In cases where the catheter can be introduced into the Eustachian tube, without much pain, and where the obstruction would require little force to overcome it, such an expedient might be preferable to puncturing the membrana tympani, in order to give exit to the pus. But where pain is produced, and force required, it will be the safest plan to desist from the attempt,

and rather to open the cavity of the tympanum from the auditory canal, this being the usual way in which the pus is discharged when unassisted by art.

The following is a case of internal acute inflammation of the submucous cellular tissue of the tympanum, which will illustrate the principal features of this disease.

*Case.* E. Smith, aged fourteen years, has had a discharge from her left ear for three years, which ceased about two months ago. She was then suddenly seized with violent pain in the head, with great restlessness, furred tongue, and all the symptoms of acute inflammation of the tympanum. Leeches were applied to the temples, and behind the ears, purgatives were administered, and warm fomentations were applied to the ear. These remedies, however, afforded little or no relief. She screamed violently; the pain in the head was intense, and all her symptoms indicated that if relief was not shortly obtained she would sink. At the end of the sixth day a copious discharge took place from the meatus, and all the severe symptoms ceased.

There can be little doubt that had not the membrana tympani given way in this case, the disease

would speedily have proved fatal through its extension to the brain and its membranes.

*Chronic Inflammation of the Tympanum.*—The same tissues of the tympanum may be involved in *chronic* as well as acute inflammation, and this may arise as a consequence of the acute form, or it may come on after a much less severe form of inflammation. Whatever be its cause, it is always attended with a discharge, and has been called by some writers “purulent otorrhœa,” and is that form which would be most frequently designated “otitis interna chronica,” although, as it will be seen shortly, there is a chronic form of the inflammation of the mucous membrane of the tympanum. The two forms are frequently confounded, but the chronic form of the disease involving only the mucous membrane, is so very different in its character and termination generally, from that which involves the submucous cellular tissue, and extends to the periosteum and bones, as to warrant their distinction.

The symptoms of the latter form resemble those of acute inflammation of the same part, but are

not so severe. There is frequently a dragging tearing pain in the ear, but without any serious general symptoms, except a great amount of debility. There is always more or less tinnitus, and considerable dulness of hearing. In these cases the walls of the tympanum are mostly involved in disease, and the consequence of the caries is the production of a discharge which destroys the membrana tympani, and appears at the meatus. The symptoms, however, are not at all relieved by the appearance of this discharge, which is so anxiously looked for in the acute form. The matter which is thus discharged in some cases is of a whitish or greenish yellow colour and thick consistence, but in others it is watery and bloody, very acrid, and having an almost insupportable odour. When this is the case the ossicles have generally been destroyed, and it is not an uncommon occurrence to find portions of dead bone mixed with the discharge. This goes on, and the pain becomes more and more severe, the mind is confused, the patient becomes heavy, delirium frequently sets in, and shortly precedes coma, convulsions, and death. In other cases a fatal ter-

mination comes on, from the establishment of acute otitis, which extends to the brain, and of which the following case, which occurred in the writer's practice, is an illustration.

*Case.* Miles, aged eighteen, a jeweller by trade, of a pale complexion, with light hair, had been subject to headache for more than a year, and had had occasional discharges from the left ear for several years, but had always been able to follow his work until within the last few days.

July 13th. His present symptoms are pain in the forehead, pupils contract on exposure to light, bowels freely moved by salts and senna, pulse 80, tongue slightly furred. Ordered twelve leeches to the forehead, and a dose of calomel and jalap.

14th. Had a tolerably good night, slept quietly, was down stairs, answers questions with difficulty, and seems not fully to comprehend what is said to him ; pain in the head not relieved ; pupils do not contract so freely as yesterday. Ordered his head to be shaved, a warm poultice to be applied to the ear, a blister to the nape of the neck, and a calomel pill every three hours.

15th. Comatose, pulse 60, full, bowels open,

pupils more dilated, contract when exposed to a strong light. Ordered leeches behind the ears. He remained in the same state till midnight, when he died.

*Inspectio cadaveris, forty hours after death.*—The calvarium having been removed, pus was seen oozing through the glandulæ Paccionæ, and on removing the dura mater the whole of the anterior portion of the brain was covered with thick purulent matter as far back as each ear, and its extent might be represented by a line drawn from ear to ear. Anteriorly, the hemispheres were firmly agglutinated by lymph, and it was with some difficulty they were separated. Posteriorly, the space between the hemispheres was filled with pus extending over the tentorium. The posterior inferior part of the cerebrum was covered with a thick layer of organised lymph, beneath which pus was deposited. In the right hemisphere of the brain, between the convolutions, were two hydatids, one nearly as large as a grape, the other somewhat smaller. *The petrous portion of the left temporal bone was much softened*, and of a dark colour; and on being cut into contained a

small portion of cheesy matter. The brain was softer than natural, and the ventricles empty.

In other cases, however, the symptoms do not run the course thus exemplified. After the discharge has taken place it may improve in character ; and, after the lapse of several weeks or months, assume the appearance of mucus, and then gradually subside, the pain lessening, and the dulness of hearing becoming less. In another set of cases an attempt at cicatrization on the part of nature takes place, and a false membrane is formed on the exposed wall of the tympanum. Such a false membrane is easily distinguished from the true membrana tympani by its being seated much deeper, and by the hollow of the tympanic cavity being seen around its circumference. There is still a secretion of pus going on, which should always be removed by careful syringing with warm water. In this state, when care is taken to avoid cold, and the functions are kept in a healthy state, the case may go on for years without any thing occurring to excite apprehension ; but it should always be borne in mind that there is a constant risk of exciting active inflammation.



During the progress of the worst forms of this disease many peculiar symptoms arise from the particular structures involved. Frequently the portio dura, in its progress through the aqueduct of Fallopius, is implicated by the mischief going on in the petrous bone ; and in these cases convulsive twitchings and paralysis of the face occur. The disease often spreads to the mastoid cells, and there may be a carious state of the mastoid process, which will keep up profuse suppuration in the cellular tissue around the ear, and sometimes it will extend down the neck, forming abscesses which discharge a fetid matter. In these cases hectic comes on, from which the patient may sink, or if he recovers, it is only very slowly. In other cases, abscesses form from exposure to cold, or any other cause exciting a more active state of inflammation, and burst or are opened over the region of the mastoid processes, and from these portions of dead bone and sometimes the ossicula are discharged. Under these circumstances the inflammation often extends to the brain, and destroys the patient.

The morbid appearances of the ear after death

in these cases are various, according to the length of time the disease has existed. Pus is found, in the chronic as well as the acute form, in the cavity of the tympanum, in the labyrinth, and in the cell of the mastoid process. There is mostly softening and degeneration of the mastoid cells as well as of the petrous bone, to a greater or less extent. The dura matter covering the petrous bone is thickened, discoloured, and sometimes detached; and this as well as the brain and cerebellum present to a greater or less extent a suppurative state. Sometimes the serous and purulent secretions are connected with the cavity of the tympanum and meatus by means of the carious petrous bone, and an exit is thus partially obtained for them through the meatus.

The same causes which produce the acute inflammation produce also the chronic form. It most frequently occurs in persons of scrofulous constitutions, or in those who are tainted with syphilis. Scarlet fever, measles, smallpox, and other affections of the skin are often accompanied by an affection of the ear which sometimes results in this form of the disease, so also dentition.

The connection of this disease also with that cachectic state of the body in which tubercle is deposited is very frequent, of which the case related above is an example. Tuberculous matter, of a cheesy colour and consistence, has often been found in the petrous bone and in the mastoid process.

In the diagnosis of this disease there is the greatest difficulty in children ; and on this account the state of the ears should be carefully inquired into wherever symptoms of inflammatory action in the brain present themselves. Although the general principles on which idiopathic inflammation of the brain and that arising from chronic otitis should be treated may be the same, yet where this latter disease has been the exciting cause, there is a state of the system in which depletory measures must be used with caution and watched with assiduity.

In the TREATMENT of chronic inflammation of the tympanum the general health must be especially attended to, and the first symptoms of cerebral affection should be carefully looked after, and actively met when detected. It is, however, too

frequently the case, that the practitioner is not consulted in chronic otitis until cerebral symptoms have presented themselves, so that little can be done for the disease of the ear. In cases where the cerebral disease threatens to become severe, every means should be taken to prevent irritation. Leeches should be applied to the ear, and where the discharge has been suppressed warm fomentations and poultices, with the view of restoring it.

When the treatment is commenced before the head disease has shown itself, great care should be taken not to suppress the otorrhœa suddenly, and for this purpose powerful astringent injections must be carefully avoided. The auditory tube should be kept clean, and this may be done by cautiously syringing it several times a-day with lukewarm water. Kramer's solution of acetate of lead, its strength being proportioned to circumstances, may also be poured into the auditory canal two or three times a-day. Tartar-emetic ointment may at the same time be rubbed behind the ear until a copious eruption is produced, and this should be renewed from time to time. In those cases where matter presents itself over the region

of the mastoid process, the part should be laid open with the lancet. Mercury, carefully administered, is sometimes of great service.

It is frequently the case that this inflammation is attended with fungous growths, proceeding from the mucous surface of the tympanum, which will sometimes block up the cavity, and prevent the discharge of matter to a greater or less extent. If these excrescences exist, and do not improve under the above treatment, they should be touched with the nitrate of silver. In caries of the ear, Kragen-berg has recommended assafœtida and phosphoric acid, given internally; and he uses for the discharge, injections of corrosive sublimate and nitrate of silver, with opium. Perforation of the mastoid process has been proposed, for the purpose of throwing injections into the middle ear. But, besides that the same unfortunate result may arise which took place in the person of Dr. Berger, physician to the king of Denmark, the severity of the operation is quite unequal to the benefit sought to be obtained.

The following cases of internal chronic otitis are selected from the writer's case-book, as illustrations of the disease.

*Cases.* M. W., aged twelve, had been subject to pain in his right ear at intervals for several years, attended with deafness, and occasionally accompanied by a discharge of matter. On examining his ear, the membrana tympani was found partially destroyed, and there was a discharge of a thin purulent matter. The treatment in this case consisted in the administration of mild alteratives; and a few drops of a solution of sulphate of zinc, in the proportion of five grains of the salt to an ounce of distilled water, were ordered to be dropped into the ear twice a-day. The tympanal cavity was occasionally washed out with a little warm water, injected by the catheter through the Eustachian tube. By persevering for a short time in the use of these means, hearing was to a considerable extent restored.

John Jackson, aged fourteen, of a scrofulous habit; had suffered from otorrhœa for some months. The membrana tympani was partially destroyed in each ear. The same plan was pursued as in the above case. Both ears were washed out through the Eustachian tube, which gave great relief at once. A liniment, also, consisting of

croton oil and soap-liniment was rubbed in behind the ears night and morning. In the course of a few weeks his hearing became much improved.

*Inflammation of the Mucous Membrane of the Tympanum, with accumulations of mucus.*—This is called by Itard internal catarrhal otitis, and has obtained a variety of names from different authors. The distinguishing character of this disease, compared with the last form of inflammation, is its mildness, and it has hence been called subacute. The inflammation is supposed, in all cases, to be confined to the mucous membrane, but there can be no doubt that it occasionally extends to the submucous cellular tissue, and even lays the foundation of the acute and chronic forms of inflammation, of which we have just spoken. At the same time it is of great importance to distinguish this form of inflammation from the others, as it is a disease very much under the influence of judicious treatment, and, of all diseases of the ear producing deafness, that which may be most entirely relieved.

This subacute inflammation of the tympanum is

always attended with an accumulation of mucus, and frequently extends to the Eustachian tube, which may be also blocked up with mucus. This inflammation of the membranes of the ear comes on during those attacks of catarrh and sore throat, which are so frequent in this country during damp weather. In most cases of catarrh the symptoms of a deranged state of the mucous membrane of the tympanum are present, but little attention is paid to them, as they generally disappear with the other symptoms. This, however, is a much more frequent cause of deafness in this country than is generally supposed; and it is of great importance that it should be well understood, as surgical art can do so much towards its removal.

This disease may also be divided into two forms, the *acute* and *chronic*.

The *acute* form is generally present during a severe cold. The Eustachian tube being involved, its mucous lining becoming tumefied, is entirely blocked up, so that the passage of air to and from the tympanum is entirely prevented. There is dulness of hearing, buzzing in the ears, more or less tinnitus, and sometimes an itching in



the auditory passages. In most cases the tumefaction of the Eustachian tube goes off as the catarrh gets better, and then the function of the part is restored, but frequently the Eustachian tube remains blocked up with mucus, or its walls are glued together, and there is an accumulation of mucus in the tympanum. In such cases, after the inflammation which has produced the secretion of mucus, has disappeared, the mucus in the tympanum becomes thickened by the absorption of its thinner part ; and as no air can enter into the cavity, in order to fill up the void thus produced, the pressure of the atmosphere upon the membrana tympani forces it inwards, and it assumes externally a concave form. In these cases, sometimes, a sudden effort, such as coughing, sneezing, yawning, or the like, sets free the Eustachian tube, then a sudden rush of air going to the tympanum, relieves the membrane from the pressure, and a loud crack is heard, and at the same time the patient is restored to hearing. This has led to a popular notion in all cases of deafness that hearing will be restored, when a crack in the ear takes place, and many persons afflicted with the other forms of aural disease, go through life

anxiously expecting the crack, which cannot possibly occur to them, from the very nature of their disease.

The *chronic* form of this disease may occur by itself, being attended with altogether milder symptoms of catarrh, or it may remain as the consequence of the acute form, or of the attacks of some of the exanthemata. Scrofulous children are very liable to this form of inflammation, just as they are to the same kind of inflammation of the mucous membrane of the nose, and the cavities leading from it. In such cases the patients are usually better in dry weather, when the action of the skin relieves the mucous membrane. Such cases are also frequently found in moist climates and situations, and will be relieved by a removal to drier countries.

Although *Obstruction of the Eustachian Tube* is frequently spoken of as a distinct disease, it is so often the concomitant of the blenorrhœal inflammation of the mucous lining of the middle ear, that it had better be spoken of in this place. When deafness occurs after repeated attacks of inflammation of the tonsils, and if, on examining the external ear, no appearance of disease present itself,

either in the meatus or in the membrana tympani, and if upon a forcible expiration, the mouth and nostrils being held, air is not driven into the ear, it may be strongly suspected that there is a closure of the Eustachian tube, which is more or less complete.

*Catheterism.*—The diagnosis, however, of obstruction of the Eustachian as well as of muculent accumulations in the middle ear, can only be accurately made out by the use of the catheter. As the application of catheterism to the Eustachian tube is not generally practised, although it has been known for some time, it may be as well to say a few words here on the subject. This operation, it appears, was first performed on himself by Guyot, a postmaster, at Versailles, who suffered from deafness. He introduced an instrument into the Eustachian tube through the mouth. Our countryman, Cleland, soon after performed the operation through the nose, and used for this purpose flexible silver catheters. But the catheter now most commonly in use, and which was recommended by Laissy and Itard, and used by Kramer, Pilcher, and other

surgeons of eminence, is an inflexible silver catheter, about six inches long, and of a calibre, varying from the size of a crow-quill to that of a large goose-quill. The extremity is well rounded, and it should have a curve at about five lines from the further end, which should correspond with the lateral situation of the mouth of the Eustachian tube. The catheters should be graduated with inches, which will be found useful in their repeated introduction.

In passing the catheter the instrument should be warmed and oiled, and passed along the floor of the nostril with the convexity upwards and the concavity downwards. It should then be gently turned just before it reaches the pharynx, so that the point shall be outwards and a little upwards, as the mouth of the Eustachian tube is above the level of the floor of the nose. The operator will readily feel when the catheter slips into the orifice of the canal.

The uses of the catheter in aural surgery are several. In the first place, it is a valuable means of diagnosing some of the more important diseases of the ear. In the second place, it may be

employed to inject water, air, or vapours into the middle ear, for the purposes of treatment. It may also be employed with the view of dilating stricture of the tube, or of removing blood which may have accumulated in the tympanal cavity.

When there is muculent obstruction of the middle ear, it is frequently the case that there is no symptom present to indicate derangement of the organ but deafness, and this will not point out its own source. In consequence of this, recourse must either be had to auscultation or the catheter. But as the former means of diagnosis is difficult and uncertain, the latter ought alone to be relied on. If air be injected into the catheter, whilst it is in the Eustachian tube, and mucus should be present in the middle ear, a distinct gurgling noise will be heard. In most cases, too, after this operation the patient feels relieved from any noises that he might have felt, and in favourable cases there is an immediate improvement in hearing.

In the TREATMENT of this disease, attention must be paid to the severity of the symptoms. The acute form may require leeches or cupping behind the ear; blisters also at the angle of the jaw near

the Eustachian tube should be had recourse to, and diaphoretics administered. But where all inflammatory symptoms are gone, and deafness remains from the accumulated mucus, recourse must be had to the catheter, and the injection of air. The surgeon is, however, seldom consulted in the acute form of this disease, and it is mostly the consequential accumulation of mucus, or a chronic form of the inflammation, which he is called upon to attend.

In chronic catarrhal inflammation of the middle ear attention should be paid to the general health, especially to the digestive organs and skin, which will be generally found in a deranged state. Alteratives, such as the hydrargyrum cum cretâ, with mild laxatives, and, in scrofulous cases, the iodide of potassium, should be administered. One of the most powerful remedial means will be found to be change of residence to a drier atmosphere, and for this purpose removal to a distance is best. In those cases where the tonsils and fauces continue in a state of chronic inflammation, scarification may be occasionally employed with advantage. Mr. Yearsley has lately recommended the

removal of the enlarged tonsils, as, he says, they press upon the mouth of the Eustachian tubes. Kramer, however, denies that they ever press so much upon the tubes as to cause deafness. But the most efficient local means of treating either mucus in the tympanum or obstruction of the Eustachian tube, is the injection into the ear either of warm water or air. After the first employment of the Eustachian catheter, the only agent ever injected into the ear was warm water; but Deleau introduced the practice of employing air, and since that time it has been very successfully used. The vapour also of acetic ether has been recommended on good authority, and has occasionally been found to act very beneficially. Although Deleau, in introducing the air-douche as a substitute for the water-douche, has made so many objections to the latter, I can add my testimony to that of Kramer in its favour. Kramer says that he has "made use of the water-douche with the greatest advantage and success;" and again, "I must still declare my opinion that it is extremely useful in this affection, and cannot at all concur in the exaggerated and imaginary objec-

tions that Deleau makes to it." Kramer is, however, decidedly averse to the practice of adding any thing, with the exception of a little common salt, to the water which is employed as a water-douche.

When the air-douche is employed, it may be done by blowing from the mouth through the catheter, or by a syringe, which answers exceedingly well, or a small air-pump. The latter is perhaps the most preferable means of directing the air into the cavity ; and a small forcing-pump adapted to the purpose is now made by Mr. Ross, optician, London. In the use of this machine, the catheter should be kept in the Eustachian tube by means of a bandage invented by Itard, and known by the name of Itard's frontlet. When the apparatus is fixed, about a dozen strokes of the piston of the pump are given, which accumulates the air in the receiver. The receiver is then placed in connection with the catheter by means of an elastic tube ; and on the cock of the receiver being turned, the air passes into the catheter and into the middle ear. When the Eustachian tube and tympanum are free from mucus, a blowing and



rustling sound is heard; but if there is mucus, then various kinds of gurgling and whistling will be evident. The effect of the introduction of the air should be attended to. Sometimes no relief is given, at other times the deafness is increased; but in many cases, on the first introduction of the air, it seems as if *the deafness was literally blown away*.

The air-douche should be repeated according to the effect produced. If the improvement continues for a few hours only, it should be repeated daily; if for a greater length of time every other day will be sufficient. When there is no thickening of the membrana tympani, and no disease of the acoustic nerves, hearing will generally be restored.

Whether the deafness depends on mucus in the tympanum or in the Eustachian tube, the air-douche will prove equally beneficial. When the Eustachian tube is glued together with thick mucus, the first sound that is heard is a whistling, and after that a gurgling. When the Eustachian tube is clogged up with mucus, there is at once a gurgling sound produced. When the tubes and

ear are quite free from mucus, only a rushing sound is heard.

There are, however, some cases in which, from some cause or other, the Eustachian tube is permanently obstructed, so that the catheter cannot be introduced. It was long ago proposed by Sir Astley Cooper, before the Eustachian catheter was generally known or used, that, in cases of obstruction of the Eustachian tube, the membrana tympani should be perforated, in order that the air, which could not find entrance by the tube, might have access in this way. This operation should not, however, be had recourse to at the present day unless it be found quite impossible to introduce the catheter. One great objection to it is the readiness with which the wound heals after the operation. To obviate this difficulty a quadrangular perforator has been used, and Himly recommends a small punch, by which a piece of the membrane may be cut out.

The following cases will afford illustrations of the forms of disease of the middle ear of which we have been speaking.

*Case of obstruction of the Eustachian tube.—*

Miss —— suffered severely when a child from an attack of scarlet fever. On recovering, it was observed that her hearing was entirely gone. Her articulation, from this circumstance, is now so indistinct that none but those who are intimate with her, can understand her. In this case there is complete obstruction of the Eustachian tube. The author has known this lady for some time, and has little doubt, if she would submit to the operation of punching the membrana tympani, that her hearing would be, to a considerable extent, restored.

*Cases of inflammation of the mucous membrane of the tympanum, with accumulation of mucus.—*

Richard Sheriffe had been deaf for three or four months, and was obliged to give up his situation in consequence. On throwing air into the tympanum through the Eustachian tube, a distinct gurgling noise was heard. Before the operation was completed he said that he heard better. He is now (Dec. 1843) under treatment, and his hearing is much improved. He says he shall soon be able to resume his employment.

Harriett Owen had been deaf for six months, which she attributed to having taken cold. She complained of an uncomfortable sensation in both ears, and could only hear a watch when placed close to her head. The tonsils and pharynx were slightly inflamed. The Eustachian catheter was introduced, and air thrown in by means of the syringe, which afforded immediate relief. She took an alterative pill every night, and an irritating ointment was applied behind her ears. Air or warm water was introduced into her ears every other day. Her hearing was perfectly restored.

Many other cases might be quoted, but these will be sufficient to indicate how greatly this form of inflammation of the ear may be relieved when properly treated.

*Of inflammatory diseases of the internal ear very little is at present known. That the labyrinth is the seat of inflammation sometimes, there can be no doubt; but its most frequent occurrence is from an extension of the disease from the external or middle ear. At present, the indications of inflammation of the labyrinth are obscure, and few*

cases are recorded on which any dependence can be placed. Some of the post-mortem appearances would, however, lead to the conclusion that inflammatory action may not be unfrequent in the labyrinth. The membrane is sometimes very much thickened, the *aqua labyrinthii* has also been found turbid, thickened, or diminished in quantity. The auditory nerve has been found softened and disorganised, and presenting a condition similar to that of other parts which are the seat of inflammation. From the analogy there is between the acoustic and the optic nerve, there would also seem to be good ground for believing an inflammation of the former should exist. Such an affection would be attended with tinnitus aurium, and great intolerance of sound, pain in the head shooting into the tympanum, and symptomatic fever.

The treatment would require to be antiphlogistic, but due caution should be observed, as the disease would be likely to occur in debilitated constitutions.



## CHAPTER II.

OF DISEASES OF THE EAR, NOT PURELY  
INFLAMMATORY.

UNDER this head I propose to refer to those forms of diseases of the ear which are not strictly inflammatory, but which, at the same time, may be the result of inflammation, or attended with some degree of inflammatory action.

1. *Accumulation of hardened Cerumen in the Meatus Auditorius.*—It frequently happens that the cerumen secreted by the sebaceous follicles of the auditory canal is thrown out in such large quantities as entirely to obstruct the tube, and deprive the patient of hearing. The nature of these cases is very easily detected by an inspection of the auditory canal. In order to do this, it is seldom necessary to have recourse to the speculum auris, as drawing the auricle upwards and backwards,

and allowing the light to fall upon the meatus, will seldom fail at once to reveal the hardened mass of wax.

This obstruction may come on from various causes. Sometimes the accumulation in the ear does not come on from the secretion of an unnatural quantity of wax; but various foreign substances, such as wool, and dust of various kinds, get into the ear, and, mixing with the wax, obstruct the passage. In other cases, the hardened mass consists of wax mixed with exfoliations of the epidermis, with hairs, or even some kinds of earthy matter. This kind of accumulation is the result of an erythematic inflammation of the tube, attended with increased action of the ceruminous glands. In some cases, the accumulation of cerumen arises entirely from its abundant secretion: this may occur without any inflammation, and is mostly observed in lax and debilitated constitutions. This form of obstruction of the tube of the outer ear is not unfrequently met with in cases where there is muculent obstruction of the Eustachian tube.

The symptoms of this disease are very little regarded in most cases, and, with the exception of



deafness, do not often gain attention. Acute symptoms are, however, sometimes present. The deafness is preceded by a violent cold, pains over the forehead, or the frontal sinuses and ears, are present, and these are succeeded by a buzzing noise. In the course of a few days all the symptoms subside, and the accumulated wax being discharged or removed, the patient recovers.

Sometimes the hardened wax remaining in the ear for a long time produces ulceration of the *membrana tympani*; and Ribes and Chaussier once found the handle of the malleus separated from its head, and covered with hardened cerumen which had got into the tympanum. In cases where ulceration of the *membrana tympani* exists, the accumulated substance will often consist of dried pus, and a morbid kind of wax, mixed with epidermic scales.

★ The TREATMENT of this disease is very simple. In the majority of cases, simply syringing the meatus with warm water will prove the most speedy and effectual remedy. Sometimes the stopper of wax is removed by a single syringing, but in most cases it requires to be repeated twice or three times.

Caution should, however, be constantly exercised in the use of the syringe, as, in cases where there is no wax, water thrown violently upon the membrana tympani might be productive of injurious effects. If, after the syringing, no pain is felt in the ear, and no traces of disease are discernible, all the treatment that will be needed will be the application of a pledget of cotton wool dipped in sweet oil to the meatus. Where, however, there is pain, and evident vascularity of the auditory canal, a few leeches should be applied behind the ear, and a small blister, or the tartar-emetic ointment may be found desirable.

Apparently easy as the diagnosis of this disease is, medical men sometimes fail to distinguish it. Mr. Pilcher has related the case of a gentleman who had been afflicted with deafness of one ear for sixteen years, and had consulted Sir A. Cooper, Dr. Armstrong, and other eminent men, who had ordered blisters, and various other remedies, without any effect. He was at last recommended to undergo a course of warm-bathing for his general health, and one day, when in the bath, he heard a loud report, and fancied some one had shot at him,

and on looking round, he found something floating upon the water about the size of a pea, which, upon examination, proved to be a lump of hardened cerumen. From that time he heard distinctly. A similar case occurred in a friend of the author's. He had been deaf of one ear for ten years, and had consulted many medical men upon the subject, without obtaining any relief. He was one day entirely relieved, whilst bathing, by the discharge of a pellet of hardened cerumen, mixed with a little cotton-wool.

These cases are interesting, as showing how a slight cause of disease may be overlooked. In the case related by Mr. Pilcher, the gentleman's prospects were blighted for life, on account of his being obliged to resign a lucrative business, in consequence of his deafness.

## 2. *Herpetic Ulcerations of the Auditory Passage.*—

This is frequently the consequence of an extension of the disease from the auricle, where herpes and eczema are not uncommon affections. When herpes extends to the auditory passage, there is often an interstitial effusion, which, producing a

swelling of the membrane, entirely blocks up the auditory passage. It is attended with a discharge, arising from the bursting of the vesicles, as also from the excited state of the lining membrane of the tube ; and the hearing is always more or less impaired, according to the extent of the tumefaction of the tissues lining the tube. Sometimes this disease lasts for a long time, and may at last produce inflammation of the tympanum.

In the TREATMENT of such cases it will generally be found necessary to pay attention to the general health. Alterative medicines should be administered ; and the ulcerations should have applied to them black wash, or a solution of the oxymuriate of mercury. These are best applied on a camel-hair pencil. Where the disease is obstinate, counter-irritation, in the form of blisters, setons, tartar-emetic ointment, &c., should be had recourse to.

3. *Foreign Bodies in the Meatus Auditorius.*—The introduction of foreign bodies into the ear is not an unfrequent occurrence, especially amongst children during play. Such bodies are, generally,

smooth, and of a roundish or oval form, such as pebbles, cherry-stones, beads, &c., which are easily introduced into the ear, without producing pain. Peas, beans, and grains of corn are also often introduced, and the difficulty of getting them out, after they have remained in any length of time, is much increased by their swelling from commencing germination. If the body has a smooth and polished surface, it may frequently remain for months without producing much inconvenience. However, in many cases, where the patient is in bad health, or of an irritable temperament, it will produce chronic inflammation, and otorrhœa, with other consequences, may take place. It is sometimes difficult to detect the presence of an inert substance in the ear, as it may be surrounded by fungoid growths, the consequence of the inflammation it has produced by its presence. In such cases the judicious introduction of the probe will serve to indicate the fact.

In cases of this kind, the accounts of the patient and his friends are not to be relied on, and, unless a foreign body can be either seen or touched, the surgeon should be careful of using force or the

introduction of instruments into the ear for their extraction. The author has often had children brought to him, whose parents or attendants have assured him that a small stone or some other body had been thrust down into the ear ; but, upon a careful and accurate examination, nothing could be detected. The fatal consequences which may sometimes result from the attempt at extracting substances which do not exist are exhibited in a case which was detailed some time since in the pages of the ' Lancet.' A boy, about seven years of age, was supposed to have put the head of a nail into his ear, which he was unable to get out again. His father took him to a surgeon, who said he could see the nail and could easily remove it. The boy objected, and was held by four men, but no attempt was made at extraction. A few days after, he was taken to a public institution ; a director was first used, and then a pair of forceps, and so much force was employed that both were bent. A pair of hooked forceps was then thrust into the ear, and the hooks were made straight by the efforts at grasping the body, but without effect. An incision was then made into the ear, and the

nail searched for, and other forceps used without success. A pair of tooth-forceps was next employed, and something which *appeared like portions of the head of a nail* was extracted. The malleus was also removed. This operation lasted an hour, the boy was then put to bed, and, after lingering for a few days, died of inflammation of the brain.

In the removal of foreign bodies from the ear, various means must be had recourse to, according to the nature of the body. Where the substance is hard and smooth, the forceps is not at all adapted for the purpose; a small curved lever, with a small eye-hook, will be found an easy means of bringing out a foreign body. Deleau relates a case of a small stone having found its way into the tympanum, which he succeeded in forcing out by injecting warm water into the ear through the Eustachian tube.

In all cases of foreign bodies in the ear, caution should be used in the employment of means for their extraction, since, where inflammation is excited, it is better to wait till this is subdued than to run the hazard of increasing it by violent ex-

citing causes. Under such circumstances, the inflammation should be subdued by the customary treatment, and when this has succeeded, the attempt at removing the body is again admissible.

The following case of foreign body in the ear occurred at Gray's Hospital, Elgin.

*Case.*—Margaret Duff, aged eighteen, admitted January the 28th, 1839, stated that, about a year ago, whilst picking her ear with a pin, she inadvertently allowed it to slip into the ear. Till lately she had not suffered much inconvenience from the accident. At the present time, the pain is very distressing, and she is anxious to have the pin removed. The ear was repeatedly examined, with the aid of bright metallic tubes, in order to throw light into the bottom of the meatus, but not a vestige of the pin could be seen. A small speck was observed on the membrana tympani, which glistened in the light, but, as it did not yield to an easy attempt at removal, it was left. Fomentation, opiates, and the occasional application of leeches, as circumstances might require, were had recourse to, for the purpose of alleviating the pain and subduing the in-



flammation, as the removal of the pin seemed impossible.

April 30th. The ear had been examined from time to time, since her admission, for the purpose of detecting the pin, and it was not till this date that the head of the pin made its appearance. It was immediately laid hold of by a small pair of forceps, but the head alone came away, leaving the body of the pin still in the ear. The pain in the ear had increased, and at last became so severe that the patient was almost constantly moaning or screaming out. She seldom slept, and opium had almost lost its power of procuring her rest, or even affording any relief, although she took it to the extent of two drachms of the *liquor opii sedativus* in the course of the day. The irritation kept up in the system was very great, and for many days she voided no urine but by the aid of the catheter.

May 28th. On this day, the body of the pin made its appearance at the external ear, and was removed. She immediately got relief, and was soon after discharged quite well.

This case is remarkable, as showing how great an

amount of irritation may be kept up in the system, without much inflammatory action being produced. In this case no suppuration occurred in the ear.

4. *Worms and Insects in the Ear.*—Many cases have been recorded of acute pain and irritation in the ear, arising from the presence of animals in the organ. In many of these cases but little care has been taken in the examination of the animal present, and it is perhaps questionable whether an animal belonging to any other class than that of the Insecta have been introduced into the ear at all. In general, the animals present have been described as worms, which would apply to the development of any of the forms of Entozoa within the cavity of the ear, as well as to the lower state of insects. It is next to impossible that any other form of animal should locate itself in such a position. Some difficulty has been supposed to exist in accounting for animals in the ear, but as they must belong to the Entozoa or the Insecta, they can only be introduced in the modes in which these animals find their way to other parts of the body. If pain in the ear and irritation have arisen from the pre-

sence of an entozoon, the development must have taken place in the same manner as it does in the intestines, liver, and other parts of the body. If, on the other hand, the animal is found to be the larva state of an insect, the ova of the insect must in some manner have been carried into the ear. As these larvæ make their appearance in most cases subsequent to otorrhœa, it is reasonable to suppose that the ova have been deposited in the canal by the parent insect, which, probably attracted by the suppuration, has performed this operation whilst the patient was asleep. Valsalva relates the case of a young woman, who told him that when a girl she had discharged from her left ear a worm, which resembled a small silkworm; and that she had, six months previous to consulting him, discharged another. Since that period she had experienced acute pain in the forehead and temples at intervals, and often swooned away for two hours at a time. Valsalva supposed there was ulceration of the membrana tympani from the presence of the worms, and employed an injection of St. John's wort, in which mercury was agitated. The real nature of the worms discharged is not

stated. They could not, however, have been the larvæ of an insect, as they would scarcely recur after having been once discharged.

The TREATMENT of cases where there are the larvæ of insects will be to pour almond oil into the ear, and if they appear, for the purpose of breathing, to seize them with the forceps. This plan will not, however, produce any effect on Entozoa; and the only method, in these cases, is to wait till the animal is discharged, or can be seen and laid hold of with the forceps. Some writers recommend that a few drops of infusion of tobacco be added to the oil, but this is, in most cases, unnecessary, and, by killing the insects at the bottom of the ear, would render it more difficult to bring them away.

5. *Fungous Excrescences and Polypi of the Ear.*—Of these diseases, fungus is the most frequent. In most cases it proceeds from an ulcer or sinus of the walls of the auditory passage, or ulcerations of the membrana tympani. It generally consists of a mass of granulations, soft and vascular, of a palish red colour, and are most usual in long-continued otorrhœa. In some cases, cancer, involving the internal ear or neighbouring parts, makes its appearance at the external ear, in the form of a

fungous growth. The rapid manner in which they are developed, and their greater tendency to bleed, will distinguish encephaloid excrescences from those which ordinarily occur in the ear.

Fungous excrescences may be removed either by the forceps or the knife. After removal, the nitrate of silver should be applied to the wounded surface, or, in some cases, the *alumen exsiccatum* will be found equally effectual.

Polypi spring from the tegumentary lining of the auditory canal, or from the membrana tympani. In most instances they have but one pedicle; but sometimes they have more. In general, they are small, smooth tumours, supplied with very little blood, and insensible to the touch, and may exist without producing any disagreeable effect. In most cases, however, the polypus enlarges and distends the auditory passage, and produces deafness, and sometimes vertigo and vomiting.

Polypi should not be attempted to be removed by caustic, which may often produce serious disease without relieving the patient. Where they can be laid hold of, they are easily removed with the knife, or, if preferred, a ligature may be thrown

round them, and they will then come away in a short time. The narrower the root of the polypus, the more easily is it removed, and the less likely is it to return. The following case came under the notice of the author :

*Case.* D. Mason had been deaf for several years, and had occasionally a slight mucous discharge from one of his ears. Upon examining the ear, a large polypus was found, occupying nearly the whole of the meatus, and was attached to the parietes of the canal by a not very narrow pedicle. It was removed with a pair of scissors with curved blades, and afterwards touched with lunar caustic, and then with acetate of lead.

## CHAPTER III.

## ON NERVOUS DISEASES OF THE EAR.

THE function of the auditory nerve, like those of other organs of sense, may become deranged or diminished independent of any evidence of inflammatory action. Such a state of the nerve is often attended with symptoms of deranged function, and not unfrequently total deafness ensues. At the same time it should be here stated that the term "nervous deafness" is often the refuge of ignorance, and is frequently applied to forms of deafness which have a widely different origin. It is to the want of a correct diagnosis, that cases of nervous deafness, as they are called, have been treated in a way which, if the deafness depended on nervous derangement at all, must have most effectually increased the disease.

Dr. Kramer, in his work on Diseases of the Ear, treats of debility of the auditory nerve under two heads: First, augmented sensibility—Erithismus. Second, diminished irritability—Torpor. The great distinction between these two diseases is, that erithismus is invariably attended with tinnitus, whilst in torpor it is altogether absent.

*Erithitic nervous deafness* comes on with a gradual diminution of hearing, which is usually confined to one ear, or at least is observed at first in only one ear. Sooner or later, however, the other ear is observed to be affected. The dulness of hearing is soon followed by noises in the ear which was first affected, and gradually extends to the other ear. The noises at first are of a deep-toned character, resembling the foaming and roaring of the sea, the descent of rain, the rustling of wind amongst leaves, or humming and buzzing of insects. These noises go on increasing, until the disease being more fully established, they assume a higher tone, and resemble the chirping of birds, whistling or the singing of a kettle of boiling water. Sometimes these noises appear to extend



to the whole head, so that the patient is unable to refer them to any particular seat. Stormy, cold, and wet weather, depressing passions, excesses of every kind, and, in fact, whatever tends to sink the powers of the system, augment the noises and increase the dulness of hearing. On the contrary, when the weather is mild and serene, and the patient cheerful, the noises diminish, and the hearing is in some measure restored. This relief often leads the patient to an illusory hope that he is about to get well, and to defer any application for medical assistance. But every person should be aware of the danger of procrastination in these cases, and relief should be sought at once, when they find the sounds of voices in company less audible, and coming to the ear confusedly and unintelligibly.

In these cases, persons often hear the human voice better whilst a loud noise is taking place, such as the ringing of bells or the rattling of a cart, than if all was silent. The prognosis in these cases is very unfavourable, and when it occurs in persons of advanced age and debilitated constitutions, a return to healthy hearing cannot be anticipated.

In the TREATMENT, attention should be paid to the state of the general health, and every cause of disease should be as speedily as possible removed. Sometimes it is attended with symptoms of general excitement, which require allaying by sedatives ; but care should be taken not to reduce the system. In other cases, the general debility is obvious, and this should be met by the administration of tonics, as quinine, iron, &c. A change of air, with sea bathing, should also be recommended where admissible. Counter-irritants may be applied behind the ear, and a mild stimulating ointment, such as the diluted citrine ointment, may be applied to the meatus, with a view of restoring the ceruminous secretion, which is generally, in these cases, found deficient.

*Torpid nervous deafness* differs only from the preceding, by the absence of tinnitus, which constantly accompanies the erithitic form. The longer the patient is afflicted with this form of the disease the greater does the deafness become, so that, in the end, almost perfect deafness is the result. By degrees all traces of the ceruminous

secretion vanish. On examining the ear, the *membrana tympani* is found to be white, like paper, and opaque, and, frequently, the auditory passage and subjacent parts are benumbed or insensible. This state of the external ear Itard regards as the best sign of nervous deafness. Kramer considers as one of the best signs of nervous deafness, the fact that when air is injected through the Eustachian, the deafness for an hour or two afterwards is invariably increased. This is observed in both the erithitic and torpid form. Nervous deafness never comes on suddenly. It is always gradual in its approaches, and in the development of its symptoms, whether the patient is young or old.

The predisposing causes of nervous deafness are several; but the most evident is hereditary predisposition. Kramer says that a third of the cases takes place in persons whose parents, or brothers and sisters, were affected in the same way. Other most obvious predisposing causes are old age, and a general state of nervous debility. Amongst the most prominent exciting causes are cold, blows on the head, and all debilitating causes, whether mental or bodily.

In the TREATMENT of torpid nervous deafness, the state of the general health always demands attention, and where there are indications of debility, tonics should be administered. Injections of a gently stimulating character passed through the Eustachian tube may be employed. Amongst other means which have been employed to remedy this disease, is electricity, in the form of slight shocks, passed between the auditory canal and Eustachian tube.

The author is much indebted to his friend Mr. Pilcher, for frequent opportunities of witnessing the treatment of torpid nervous deafness by this means, and can bear testimony to its utility in many cases. The failure of electricity, as a remedy, may in many cases be attributed to the want of a proper selection in the persons thus treated. Itard relates several cases in which much benefit was derived from the use of electricity ; he however makes the following observation, “ *et de nos jours cette méthode de traitement a été abandonnée comme impuissante.*” Yet, notwithstanding this observation, the author has seen several cases benefited by the use of electricity. Should

further experience point out more particularly the cases to which it is applicable, and should only a few of these be relieved, it will deserve to be placed amongst the remedies for these most afflictive diseases, and be numbered amongst one of the boons to humanity. It is not here recommended as a novelty, others have observed its good effects, as well as the author. Another form of the same agent, galvanism, has also been employed with success. Le Bouvier Desmouliers mentions the case of a deaf and dumb boy that was very much relieved by galvanism; and Busch relates the case of a man that was cured in ten sittings. The following is a case from the author's notebook, treated by means of electricity.

*Case.* Mrs. Jackson, aged thirty-five, has been deaf for several years, and unable to hear the ticking of a watch, unless placed close to her ears, or in contact with the bones of the head. When there is much noise she can hear tolerably well. Alterative and tonic medicines were ordered for her, and an electric shock was passed through the ear every other day; the operation being continued for fif-

teen minutes. After every operation, she says, "she hears much better for several hours;" and her hearing is permanently improved.

The author could furnish several other cases in which the hearing has been much improved by the application of electricity : at the same time candour compels him to state, that the relief afforded has been too recent, to allow him to say that it will be permanent.

Another mode of treating torpid nervous deafness is the introducing into the ear, through the Eustachian tube, either the vapour of ether, or acetous ether diluted with water. When the latter is used, about five minims of the ether are added to the ounce of water. Such injections should be applied warm, and repeated daily, or every other day according to circumstances.

The following is a case thus treated :

*Case.* Joseph Rankin, aged fifty, has been deaf for twelve months in the right ear. A mixture of acetous ether and water was injected into the tympanum every other day. Under this treatment hearing is gradually being restored, and for some

hours after the operation, he hears almost perfectly.

When it is wished to introduce the *vapour* of sulphuric or acetic ether into the tympanum, for nervous deafness, the air-press should be used, as recommended for applying the air-douche. In using this machine, its flexible tube should be made to empty its air into a glass-receiver, containing a few drops of ether. The air sent into the receiver becomes impregnated with the vapour of the ether, and passes out by means of another flexible tube, which is attached to the Eustachian catheter. The quantity of ethereal vapour thus sent into the ear may be increased, by heating the receiver in which the ether is contained by means of a spirit-lamp.

Previous to the application of the vapour, it is always well to ascertain first, whether air enters the tympanum through the Eustachian catheter, by blowing through it. When the vapour is applied the patient should continue under the operation for about a quarter of an hour at a time, and the operation should be repeated every day, as it is found that no benefit is derived in those cases

where it is applied at irregular intervals. Of course the number of applications, and the continuance of it, must be left to the circumstance of the improvement of the patient.



THE DEAF AND DUMB.



## CHAPTER IV.

## DEAF AND DUMB.

HEARING is one of the greatest blessings which a kind providence has conferred on man ; without it he could hardly have become civilized, and much of the happiness which flows from his connection with external nature by his senses must have been denied. Although perhaps to be deprived of the sense of hearing after having possessed it till the faculty of language was developed, is felt to be a greater calamity by the individual suffering than if he were born deaf ; yet every one must feel that a double calamity rests upon the deaf-mute, however unconscious he may be of his loss. His unfortunate position has always rendered him an object of interest to the philosopher, and of commiseration to the philanthropist ; whilst one of our greatest poets has described the state of the deaf dumb as “ one of the most des-

perate of human calamities.” Any prospect therefore of relieving this afflicted portion of our race, must be received as a boon to humanity.

Although many cases of congenital deafness result from deficiencies or malformations of the ear, in which surgical art can avail nothing, yet a great proportion of the deaf and dumb lose their hearing after birth; and if only a small number of these can be relieved, it is imperative on the medical man to ascertain what is the class of cases in which treatment promises to be successful. The following statistics, although imperfect, will afford some idea of the period at which deafness most frequently occurs, when followed by dumbness, as also the causes of deafness after birth.

According to the Paris circular, the number of deaf-mutes in England when the population was twelve millions, was 7570. If the population be now supposed to be fifteen millions, this will make the number of the deaf and dumb at present in England 9462, or one to every 1585 of the inhabitants. This, however, is only an approximation to the truth, and it is much to be regretted, that no provision is made for ascertaining the number

of deaf-mutes in this country, by means of the census. Prussia, in this respect, has set an example to other governments, for it has taken the number of its deaf and dumb inhabitants three separate times.

In the institutions of Prague it appears that there are 54 deaf and dumb persons; of these 19 were born deaf, and the remaining 35 lost their hearing through diseases or accidents. Out of 51 deaf-mutes in the institutions of Leipzig, only 22 were born deaf; 4 lost their hearing during the first year; 10 during the second year; 8 in the third year; 3 in the fourth year; and 1 in the fifth year. In Dresden, the greater proportion of the deaf and dumb lost their hearing from scarlet or some violent fever, at two or three years of age. There were only two in the institution born deaf. In the deaf and dumb institution at Hartford, out of 279 inmates, 116 were born deaf, and 135 lost their hearing from disease in early infancy; of the remainder nothing certain was known. The causes producing loss of hearing in this institution were as follows: 22 from scarlet fever; 7 from measles; 6 from fever; 2

from inflammation of the brain ; and one from small-pox. At the Irish institution for the deaf and dumb, it was found that, out of 489 inmates, 423 were born deaf, and 66 lost their hearing from disease. At the Birmingham institution, out of 234 children, 102 boys and 73 girls were born deaf, the remainder having lost their hearing from disease.

The following are the diseases to which the causes of deafness have been ascribed in the remaining 59 children :

Scarlet fever	.	.	.	7
Measles	.	.	.	2
Small-pox	.	.	.	1
Inflammatory fever	.	.		15
Typhus fever	.	.	.	7
Severe accidents	.	.	.	3
Fits	.	.	.	3
Hooping-cough	.	.	.	2
Disease of the brain	.	.		2
Fright	.	.	.	1
Paralysis	.	.	.	1
Inflammation of brain	.	.		2
Teething	.	.	.	1
Uncertain	.	.	.	12
				<hr/>
				59

The periods at which these children were attacked, as far as could be ascertained, were as follows :

13		lost their hearing in the first year.	
12	—	in the second.	—
9	—	in the third.	
6	—	in the fourth.	
3	—	in the fifth.	
2	—	in the sixth.	
8		indefinitely described, in infancy.	

From these statistics it appears that, with the exception of the Irish and Birmingham institutions, that congenital deafness *is much less frequent* than loss of hearing produced by disease.

It will be seen that scarlet fever, and what is called inflammatory fever, have been the most fruitful causes of deafness after birth in the Birmingham institution. The former is assigned as a cause of the majority of such cases in all the reports. Those described as occurring under the head of inflammatory fever in the Birmingham institution are most probably cases in which the throat has suffered from violent inflammation, which had extended along the Eustachian tube ; at all events, the parietes of the tube had become

more or less adherent; and perhaps a collection of mucus, thrown out during the inflammation, had become inspissated, and lodged in the tympanum.

Congenital obstruction of the Eustachian tube is not of frequent occurrence; and where the auditory nerve is perfect, and there is no congenital malformation which may generally be supposed to be the case where deafness has come on after birth, there is every reason to hope that catheterism of the tube, where practicable, and washing out the tympanum, may be of service. Puncturing of the membrana tympani also, if performed sufficiently early, may restore hearing. The success, however, of either catheterism or puncturing the membrane of the tympanum, will depend, to a great degree, on the length of time the acoustic nerve has been allowed to remain inactive.

The author has lately had an opportunity of examining several deaf-mutes, whose hearing was lost after birth; and in most of these cases the Eustachian tube was either partially or totally obstructed, and an obviously inflammatory state of the throat existed. In one case, where the



Eustachian tube was free, the membrana tympani was thickened and opaque. In another, there was ulceration of the membrana tympani, with otorrhœa. In two cases there appeared to be no other disease than a narrowing or partial obstruction of the Eustachian tube; and these individuals could distinguish and imitate sounds. How far these cases might be received, at this distance of time, by dilating the Eustachian tube, and washing out the tympanum, is worthy of attention.

The treatment of these cases is often abandoned as hopeless. The author, however, has seen one case where hearing was restored by dilating the Eustachian tube, and the application of the air-douche. In those cases where there is a deposit in the tympanal cavity in addition to the obstruction of the Eustachian tube, it should be washed away by injecting water into the tympanum through the tube. The tympanum should afterwards have thrown into it an injection, composed of a small quantity of ether with water. In most of the cases examined by the author, there was an enlargement of the tonsils, with an inflamed state of the throat. In such cases, the throat and

tonsils should be scarified, and where the tonsils are very much enlarged, they may be removed with a pair of scissors.

Children that are born deaf should have the Eustachian tube explored as soon as their age will admit of it ; and such children as have become deaf from disease, should be treated as early as possible.

THE END.

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